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Cantada

[11] **4,436,043**

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[54] **GATE BRACKETING CUSHIONING SPRING ARRANGEMENT FOR A SEWING MACHINE**

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[73] Assignee: **The Singer Company**, Stamford, Conn.

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[51] **Int. Cl.**[3] **D05B 3/02**

[52] **U.S. Cl.** ..... **112/221**; 112/158 R; 267/179

[58] **Field of Search** ..... 112/221, 158 R, 158 A, 112/78, 79 R, 163, 167, 237-239; 267/179, 166

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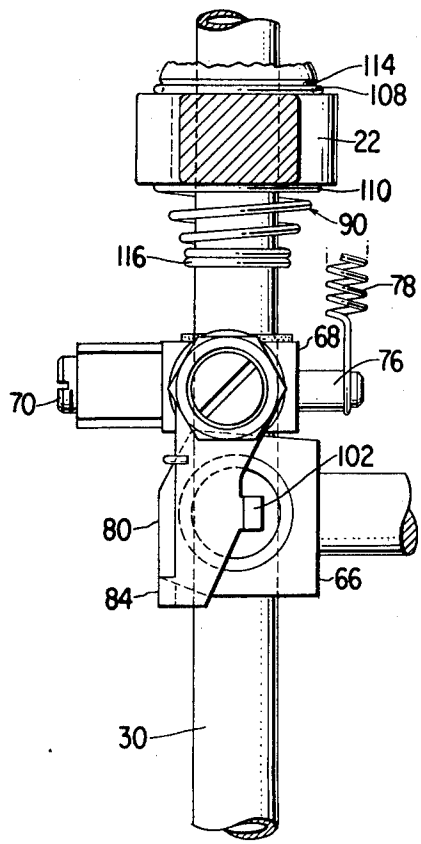
[57] **ABSTRACT**

Skip stitch mechanism for a sewing machine is provided with a coiled cushioning spring which mounts on the upper arm of a movable gate, and limits upward movement of a needle bar when disconnected from needle bar reciprocating mechanism to provide for a skipped stitch.

2 Claims, 6 Drawing Figures



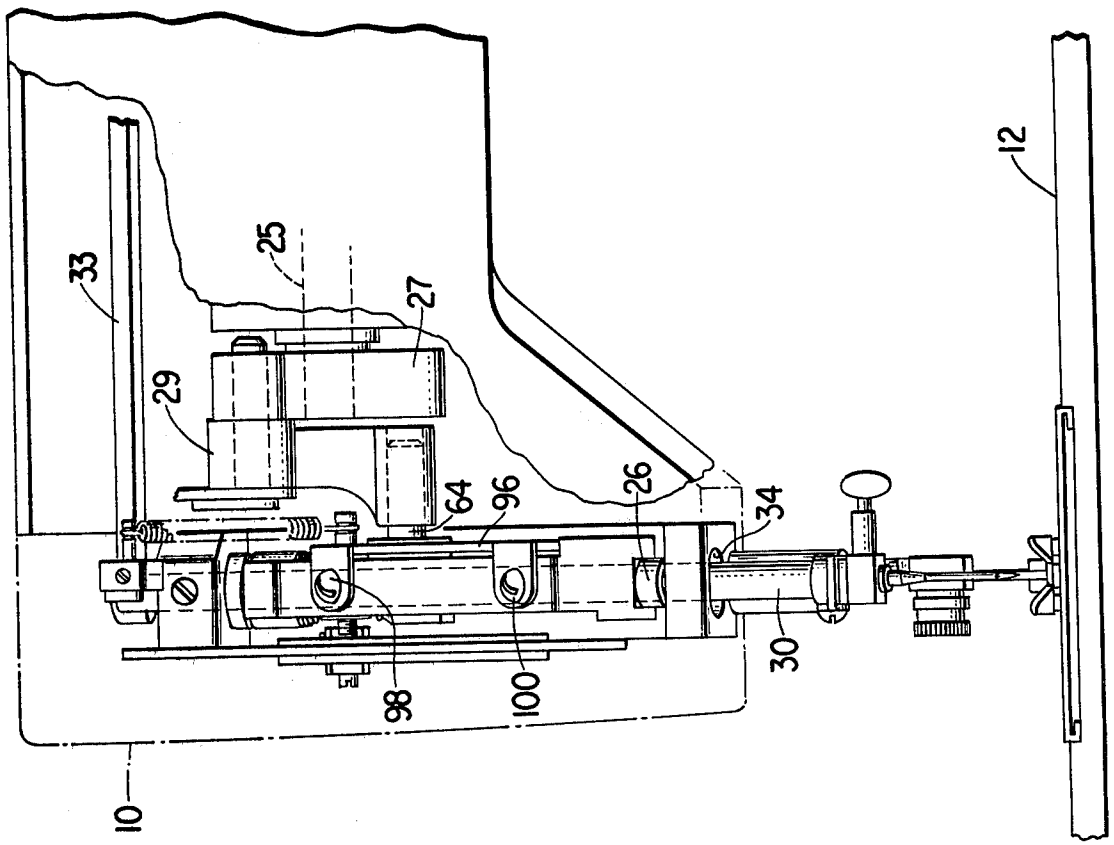

10
12
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Fig.1

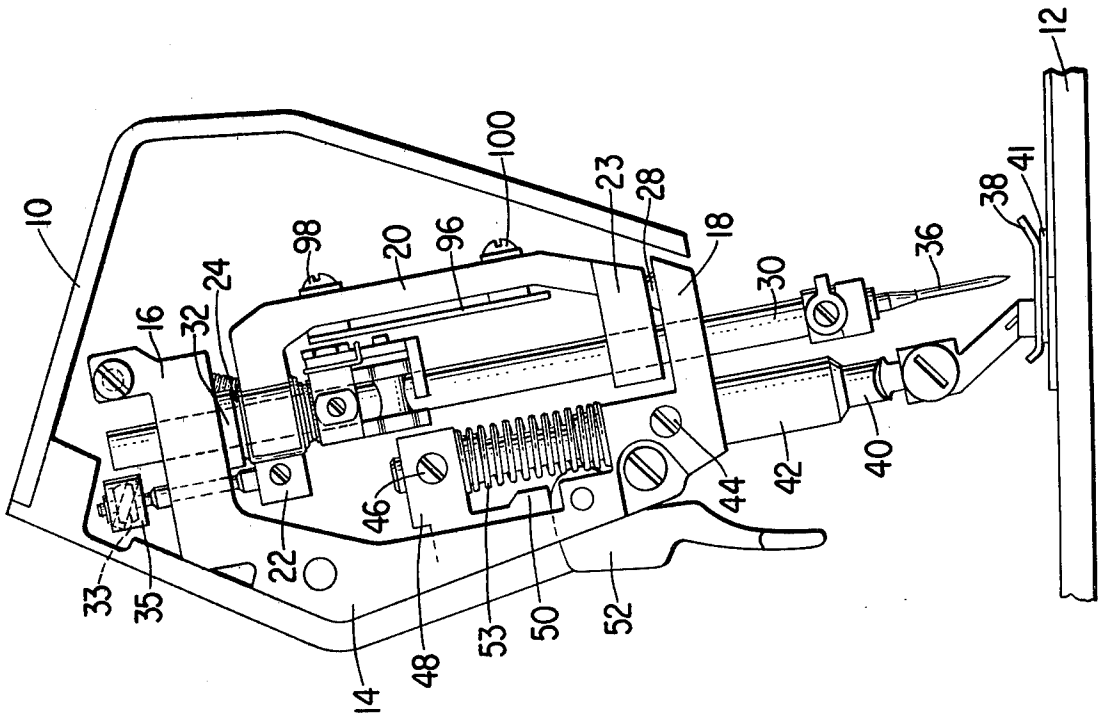
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Fig.2

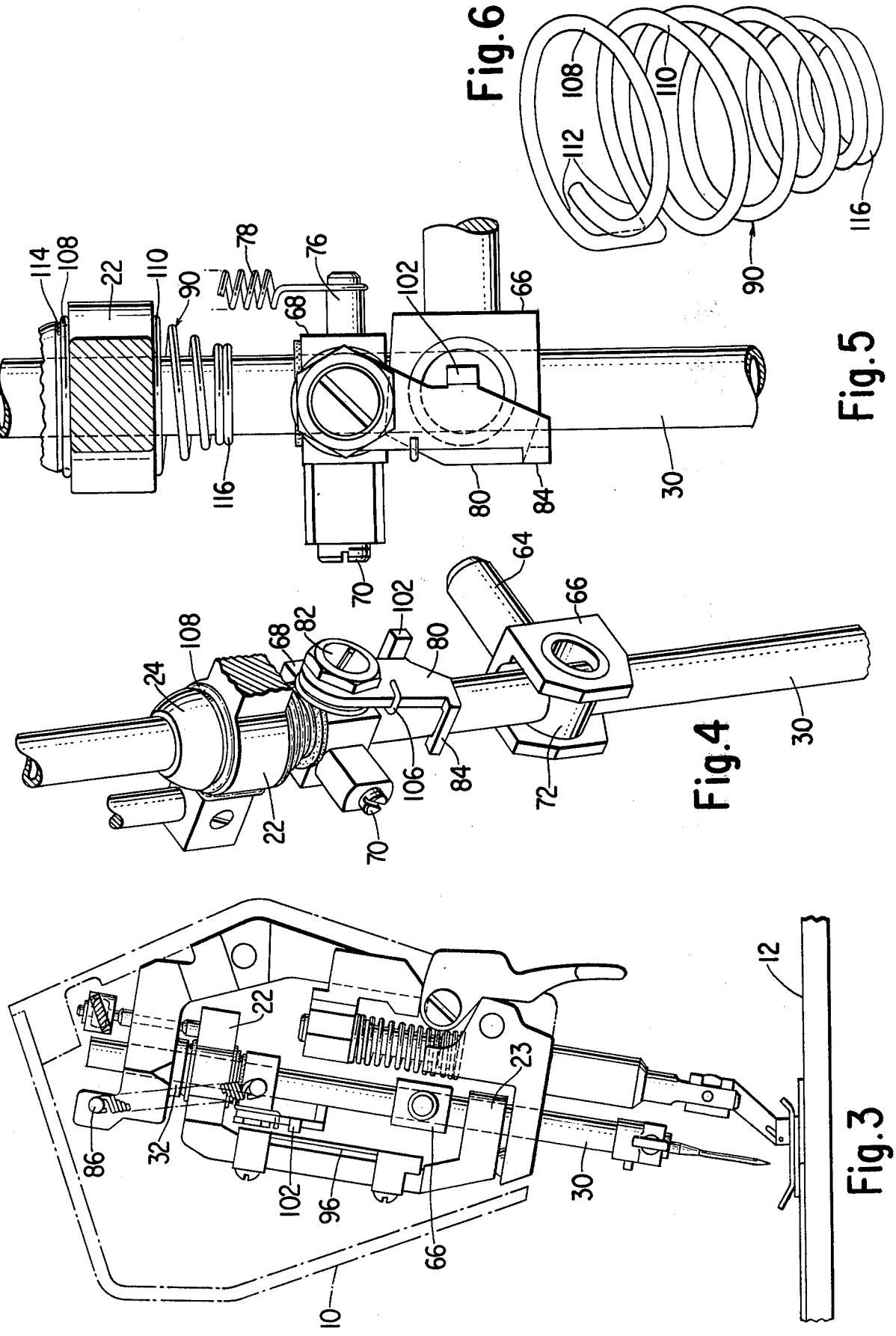
Fig.6
108
110
112
116
90
Fig.5
114
108
22
110
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76
68
102
66
116
80
84
30
70
Fig.4
64
66
102
68
82
80
108
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106
84
72
30
22
70
Fig.3
12
22
23
86
32
102
96
66
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GATE BRACKETING CUSHIONING SPRING ARRANGEMENT FOR A SEWING MACHINE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to skip stitch sewing machines which include needle bar latching and releasing mechanisms.

2. Description of the Prior Art

Skip stitch mechanisms, such as shown for example, in U.S. Pat. No. 3,782,311, of Kenneth D. Adams and Salvatore A. D'Orio for "Simplified Basting Stitch Mechanism" issued Jan. 1, 1974, and in U.S. Pat. No. 4,312,284 of Kenneth D. Adams for "Needle Bar Deflecting Arrangement for a Skip Stitch Sewing Machine" issued Jan. 26, 1982, include a normally engaged needle bar latch which is opened whenever the needle bar is jogged by a gate to a predetermined maximum lateral position on one side of a central needle bar position. The needle bar is thereby disconnected from actuating mechanism for imparting endwise reciprocatory motion thereto and a skipped stitch results. When the latch is opened to disconnect the needle from the actuating mechanism, the needle bar is drawn upward by an elevating spring into a limited position defined by the engagement of needle bar affixed structure with a fixed cantilevered cushioning spring. The cantilevered cushioning spring engaged the needle bar affixed structure at a location which is off-center with respect to the needle bar axis. As a consequence, the needle bar was loaded unsymmetrically, and undue noise was generated in the needle bar supporting bearings and in needle bar actuating mechanism. Further, the cantilevered spring had a high spring rate and this was responsible for considerable noise being generated whenever the needle bar returned to its uppermost position.

It is a prime object of the present invention to provide an improved arrangement for cushioning upward movement of an unlatched needle bar into an extreme position in a skip stitch sewing machine.

It is another object of the invention to provide an improved arrangement in a skip stitch sewing machine for applying a cushioning force to an upwardly moving unlatched needle bar released while in a maximum lateral jogged position from actuating mechanism.

It is still another object of the invention to provide skip stitch sewing machine mechanism with a needle bar cushioning spring which is inexpensive to produce and can be easily assembled in a machine.

It is also an object of the invention to provide a needle bar cushioning spring arrangement which is effective in sewing machines to minimize noise due to the operation of skip stitch mechanism.

Other objects and advantages of the invention will become apparent during a reading of the specification taken in connection with the accompanying drawings.

SUMMARY OF THE INVENTION

A coiled needle bar cushioning spring is provided in accordance with the invention for skip stitch mechanism in a sewing machine. The spring includes a pair of widely separated end coils which are spaced apart to bracket the arm of a movable gate that supports a needle bar for reciprocatory motion. One such coil is an extreme end coil which engages a needle bar bushing on an upper side of the arm of the gate and assists in holding the spring on the gate in a position wherein it is coaxial with the needle bar. The other coils of the spring extend around the needle bar under the gate arm to cushion upward movement of the needle bar when the needle bar is disconnected from actuating mechanism to provide for skip stitching.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of the head end portion of a sewing machine incorporating the cushioning spring arrangement of the invention;

FIG. 2 is an end elevational view of the head end portion of the machine from which the end cover and an end face plate have been removed;

FIG. 3 is an elevational view of the head end portion of the machine as viewed from the interior of the machine in a direction opposite to that of FIG. 2;

FIG. 4 is a fragmentary perspective view showing a cushioning spring arranged according to the invention, and needle bar latch mechanism detached from needle reciprocating drive means;

FIG. 5 is a fragmentary front elevational view showing the cushioning spring, and the latch mechanism connected to the reciprocating drive means;

FIG. 6 is an enlarged perspective view of the cushioning spring.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, reference characters **10** and **12** designate the head end portion and a work supporting bed portion respectively of a skip stitch sewing machine. As shown, the head end portion includes a fixed support bracket **14** having an upper extending arm **16** and a lower extending arm **18** wherein a gate **20** is journalled. Gate **20** includes an upper rearwardly extending arm **22** and lower rearwardly extending arm **23**. Inserted in the upper arm of the gate **20** is an upper bearing **24** having an outer spherical surface and a coaxial internal bearing surface. Inserted into the lower arm of the gate is a bearing **26** having both an internal bearing surface and spaced therefrom a socket. A spherical headed rivet **28** affixed to the lower arm **18** of the support bracket **14** has its spherical head protruding into the socket.

A needle bar **30** is supported for endwise reciprocation by a rotating arm shaft **25** acting through a crank **27** and link **29**. As shown, the needle bar **30** is supported in the internal bearing surface of the upper bearing in the upper arm of the gate **20** and in the internal bearing surface of the lower bearing in the lower arm of the gate. A socket bearing **32**, having an internal clearance hole for the needle bar **30**, is mounted in a bore in the upper arm **16** of the support bracket **14** and provides the socket for the outer spherical surface of the upper bearing **24** mounted in the upper arm **22** of gate **20**. The needle bar **30** extends through an elongated opening **34** in the lower arm **18** of support bracket **14** which provides lateral clearance for the needle bar. The gate and needle bar are laterally movable by a link **33** on a needle bar post **35** in opposite directions for zig-zag sewing and to a position beyond their zig-zagging range for skip stitching. Link **33** may be operable by cam means as in the manner indicated in U.S. Pat. No. 3,559,601 of The Singer Company issued Feb. 2, 1971, or by a servomotor as in the manner indicated in U.S. Pat. No. 3,984,745 of The Singer Company issued Oct. 5, 1976.

Attached to the lower end of the needle bar **30** is a needle **36** which cooperates with a loop taker (not shown) in the bed portion **12** of the machine. A presser foot **38**, affixed to a presser bar **40**, serves to urge work material into contact with a feed dog **41**. The presser bar is journalled in a bearing **42** which is affixed in a bore in the support bracket **14** by a screw **44**. The upper end of the presser bar **40** has affixed thereto by a screw **46**, a presser bar guide block **48**. Such guide block **48** has a tang portion **50** slidable in a slot in the support bracket **14** to prevent undesireable rotation of the presser foot **38**. The tang portion **50** of the presser guide block **48** also coacts with a presser bar lifting lever **52**, journalled on the support bracket **14**, to raise the presser foot from contact with the work material in the usual manner. Pressure exerted by the foot **38** on work material is controlled by tensioned spring **53**.

As shown, link **29** connects through a driving stud **64** with a drive link **66** which may be latched to or unlatched from a latch carrier block **68** that is affixed to the needle bar **30** by a screw **70**. The drive link **66** includes a collar **72** freely slidable on the needle bar **30** when the drive link **66** is unlatched from the block **68**. On the opposite side of block **68** from screw **70**, a pin **76** protrudes sufficiently to catch the hook end of a spring **78**. On the forwardly disposed face of the block **68**, a latch **80** pivots on a shouldered screw **82**. The latch **80** is fashioned with a rearwardly directed latch finger **84** to extend beneath and clasp the drive link **66** to the block **68** affixed to the needle bar. A second hook end of spring **78** is attached to a fixed member **86**. The spring **78** serves to lift the latch carrier block **68** and needle bar **30** to an elevated position whenever the latch **80** is disengaged from link **66**. The height to which the latch carrier and needle bar may be carried is limited by a cushioning spring **90** which is mounted on the upper arm **22** of gate **20**.

Normally the drive link **66** is latched to block **68** and the needle bar is reciprocated by the associated driving means whether the needle bar is in a central straight stitching position (FIG. **1** position), or is oscillated for zig-zag stitching. However, gate **20** is provided with a latch release abutment member **96** as disclosed in the aforementioned U.S. Pat. No. 3,782,311 for disconnecting latch **80** and thereby the needle bar reciprocating drive from the needle bar whenever the needle bar **30** is moved by link **33** acting upon gate **20** into a skip stitch position for needle **36**.

The latch release abutment member **96** which is adjustably attached to the gate **20** by screws **98** and **100** extends adjacent a forwardly extending ear **102** on latch **80**. As described in the said U.S. Pat. No. 3,782,311, when the gate is moved (to the left as viewed in FIG. **1**), beyond a maximum bight position for needle **36** to a skip stitch position, abutment member **96** is disposed to strike forwardly extending ear **102** on latch **80** moving to the right with the needle bar and uncouple the latch from the needle bar reciprocating drive thereby causing the needle bar to be drawn upwardly by spring **78** until block **68** on the needle bar impacts against the cushioning spring **90**. When contact between the abutment member **96** and forwardly extending ear **102** of the latch **80** is eliminated by movement of the gate to the right, the latch is rotated by torsion spring **106**. When drive link **66** reaches the latch **80** held in the relatching position by spring **78**, connection is again made to the needle bar reciprocating drive to initiate reciprocation of the needle bar.

As shown, cushioning spring **90** is formed with widely spaced upper end coils **108** and **110**. The coils **108** and **110** are connected by a U-shaped spring portion **112** which can be resiliently deformed to alter the spacing between said coils and so permit the spring to be clipped onto or removed from the gate arm **22**. In the mounted position of spring **90** on the gate arm, extreme upper end coil **108** bears against top of arm **22** and engages a groove **114** in bearing **24**. All of the other coils of the spring extend under gate arm **22** and taper from a maximum diameter at coil **110** in tight engagement with the underside of the arm to a minimum diameter at the extreme lower end **116** of the spring. The spring is held on the gate arm with its coils coaxial with respect to the needle bar **30**, and the needle bar extends through the coils as shown. The spring therefor loads the needle bar centrally when engaged by block **68**, and undue noise in the needle bar supporting bearings as well as in the needle bar actuating mechanism is prevented. Further, the number of coils and diameter of the wire forming the spring are selected to provide a spring rate effective to minimize the noise level.

It is to be understood that the presnt disclosure relates to a preferred embodiment of the invention which is for purposes of illustration only and is not to be construed as a limitation of the invention. Numerous alterations and modifications of the structure herein disclosed will suggest themselves to those skilled in the art, and all such modifications and alterations which do not depart from the spirit and scope of the invention are intended to be included within the scope of the appended claims.

I claim:

1. In a sewing machine, a needle bar, a movable gate with a bearing therein in which the needle bar is supported for endwise reciprocation, latching means carried on the needle bar, actuating means for imparting endwise reciprocatory motion to the needle bar through said latching means, means for unlatching the latching means from said actuating means, elevating spring means for raising the needle bar when unlatched from the actuating means, a fixed member on the needle bar, and a cushioning spring clipped with upper end gate bracketing coils onto the gate structure in a coaxial position with respect to the needle bar for engagement by said fixed member when the needle bar is raised by the elevating spring means, the said bearing being located in an arm on the gate for the needle bar, the bearing being encircled and gripped on an upper side of the arm by one of the coils of the cushioning spring, and the the other coils of the spring being located under the arm.

2. The combination of claim **1** wherein the coils under the arm decrease in diameter downwardly from the arm.

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